

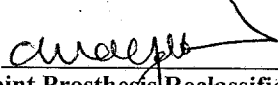
**Orthopaedic Surgical Manufacturers Association (OSMA)
Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition**

DEPARTMENT OF HEALTH AND HUMAN SERVICES

RECLASSIFICATION REVIEW MEMORANDUM

Division of General and Restorative Devices
Orthopedic Devices Branch, HFZ-410
(301) 594-2036

Food and Drug Administration
Office of Device Evaluation
Center for Devices and Radiological Health
9200 Corporate Boulevard
Rockville, MD 20850

Date: 7/11/01
To: Glenn Stiegman; Hany Demian; File
From: Martin A. Yahiro, M.D., Medical Officer 
Subject: Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition
Sponsor: Orthopaedic Surgical Manufacturers Association (OSMA)
1962 Deep Valley Cove
Germantown, TN 38138
(901) 754-8097
Contact: Tom Craig
Date Assigned: 6/3/01

No document number

Lead Reviewer: Glenn Stiegman

Summary of the Unpublished Clinical Studies

Study A

The investigation was a prospective, multi-center, randomized controlled clinical trial performed in the U.S., utilizing the ULTIMA® MOM Total Hip System—Cemented (P.F.C.® Hip Femoral Stem) and the ULTIMA® MOM Total Hip System—Cemented (S-ROM® Hip Femoral Stem). The diagnostic indication was non-inflammatory degenerative joint disease (NIDJD), which included osteoarthritis, avascular necrosis, developmental hip dysplasia, protrusio acetabula, crystalline arthropathy, slipped capital femoral epiphysis, and traumatic arthritis. The investigation had two treatment arms: cemented and uncemented femoral components. The patients were randomly selected to receive either the metal acetabular liner or the UHMWPE liner. The Harris Hip Score was used for clinical assessments. The sponsor provided the mean Harris Hip Scores for the groups at 3 time points (preop, 12 months, and 24+ months), but did not present the data in terms of numbers of patients who had different HHS levels, e.g., Excellent (≥90 points). The sponsor reported the radiographic results in terms of the incidence of femoral stem subsidence, femoral radiolucencies (AP and lateral views), femoral shaft resorption (AP and lateral views), hypertrophy around the femoral stem, endosteal cavitation, cup migration, and heterotopic ossification.

There were 219 patients in the investigational group and 206 patients in the control group. There were 115 men and 104 women, with a mean age of 55.7 years in the investigational group and 127 men and 79 women, with a mean age of 57.0 years in the control group. The diagnostic indications for the investigational and control groups, respectively, were osteoarthritis 164 and 152, avascular necrosis 29 and 33, post-traumatic arthritis 11 and 10, BDH 8 and 8, and other 7 and 3. In the metal-metal group, there were 21 men (51.2%) and 20 women (48.8%), and in the metal-poly group, there were 30 men (65.2%) and 16 women (34.8%).

The patient follow-up rates for the metal-metal and metal-poly groups at 24-months were 36.7% and 46.0%, respectively. The data availability at 24 months were 34.9% and 48.0% for radiographic data and 33.9% and 44.0% for the Harris Hip Score data, for the metal-metal and metal-poly groups, respectively.

The mean Harris Hip Scores for the metal-metal and metal-poly groups at 24+ months were 95.1 and 91.5 points, respectively. The radiographic findings were difficult to interpret because the sponsor did not distinguish between significant and non-significant radiographic findings. The incidences of acetabular radiolucencies at the 24-month and 24+-month time point for the metal-metal group were 5.3% and 5.1%, respectively, and for the metal-poly group were 6.3% and 6.3%, respectively. Acetabular cup migration in the superior-inferior direction occurred in 42.1% of the patients in the metal-metal group and 31.3% of the

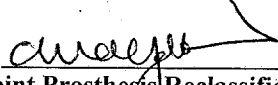
**Orthopaedic Surgical Manufacturers Association (OSMA)
Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition**

DEPARTMENT OF HEALTH AND HUMAN SERVICES

RECLASSIFICATION REVIEW MEMORANDUM

Division of General and Restorative Devices
Orthopedic Devices Branch, HFZ-410
(301) 594-2036

Food and Drug Administration
Office of Device Evaluation
Center for Devices and Radiological Health
9200 Corporate Boulevard
Rockville, MD 20850

Date: 7/11/01
To: Glenn Stiegman; Hany Demian; File
From: Martin A. Yahiro, M.D., Medical Officer 
Subject: Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition
Sponsor: Orthopaedic Surgical Manufacturers Association (OSMA)
1962 Deep Valley Cove
Germantown, TN 38138
(901) 754-8097
Contact: Tom Craig
Date Assigned: 6/3/01

No document number

Lead Reviewer: Glenn Stiegman

Summary of the Unpublished Clinical Studies

Study A

The investigation was a prospective, multi-center, randomized controlled clinical trial performed in the U.S., utilizing the ULTIMA® MOM Total Hip System—Cemented (P.F.C.® Hip Femoral Stem) and the ULTIMA® MOM Total Hip System—Cemented (S-ROM® Hip Femoral Stem). The diagnostic indication was non-inflammatory degenerative joint disease (NIDJD), which included osteoarthritis, avascular necrosis, developmental hip dysplasia, protrusio acetabula, crystalline arthropathy, slipped capital femoral epiphysis, and traumatic arthritis. The investigation had two treatment arms: cemented and uncemented femoral components. The patients were randomly selected to receive either the metal acetabular liner or the UHMWPE liner. The Harris Hip Score was used for clinical assessments. The sponsor provided the mean Harris Hip Scores for the groups at 3 time points (preop, 12 months, and 24+ months), but did not present the data in terms of numbers of patients who had different HHS levels, e.g., Excellent (≥ 90 points). The sponsor reported the radiographic results in terms of the incidence of femoral stem subsidence, femoral radiolucencies (AP and lateral views), femoral shaft resorption (AP and lateral views), hypertrophy around the femoral stem, endosteal cavitation, cup migration, and heterotopic ossification.

There were 219 patients in the investigational group and 206 patients in the control group. There were 115 men and 104 women, with a mean age of 55.7 years in the investigational group and 127 men and 79 women, with a mean age of 57.0 years in the control group. The diagnostic indications for the investigational and control groups, respectively, were osteoarthritis 164 and 152, avascular necrosis 29 and 33, post-traumatic arthritis 11 and 10, BDH 8 and 8, and other 7 and 3. In the metal-metal group, there were 21 men (51.2%) and 20 women (48.8%), and in the metal-poly group, there were 30 men (65.2%) and 16 women (34.8%).

The patient follow-up rates for the metal-metal and metal-poly groups at 24-months were 36.7% and 46.0%, respectively. The data availability at 24 months were 34.9% and 48.0% for radiographic data and 33.9% and 44.0% for the Harris Hip Score data, for the metal-metal and metal-poly groups, respectively.

The mean Harris Hip Scores for the metal-metal and metal-poly groups at 24+ months were 95.1 and 91.5 points, respectively. The radiographic findings were difficult to interpret because the sponsor did not distinguish between significant and non-significant radiographic findings. The incidences of acetabular radiolucencies at the 24-month and 24+-month time point for the metal-metal group were 5.3% and 5.1%, respectively, and for the metal-poly group were 6.3% and 6.3%, respectively. Acetabular cup migration in the superior-inferior direction occurred in 42.1% of the patients in the metal-metal group and 31.3% of the

**Orthopaedic Surgical Manufacturers Association (OSMA)
Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition**

metal acetabular liner or the UHMWPE liner. The acetabular shells were implanted without cement, but both cemented and uncemented femoral prostheses were used.

The Harris Hip Score was used for clinical assessments. The sponsor provided the mean Harris Hip Scores for the groups at 3 time points (preop, 12 months, and 24+ months), but did not present the data in terms of numbers of patients who had different HHS levels, e.g., Excellent (≥ 90 points). The sponsor reported the radiographic results in terms of the incidence of femoral stem subsidence, femoral radiolucencies (AP and lateral views), femoral shaft resorption (AP and lateral views), hypertrophy around the femoral stem, endosteal cavitation, cup migration, and heterotopic ossification.

There were 97 patients in the investigational group and 97 patients in the control group. There were 71 men and 26 women, with a mean age of 49.8 years in the investigational group, and 72 men and 25 women, with a mean age of 50.3 years in the control group. The diagnostic indications for the investigational and control groups, respectively, were osteoarthritis 75 and 72, avascular necrosis 12 and 14, post-traumatic arthritis 6 and 7, and other 4 and 4. In the metal-metal group, there were 28 men (71.8%) and 11 women (28.2%), and in the metal-poly group, there were 33 men (78.6%) and 9 women (21.4%).

The patient follow-up rates for the metal-metal and metal-poly groups at 24-months were 36.7% and 46.0%, respectively. The data availability at 24 months were 45.8% and 47.0% for radiographic data and 41.7% and 47.0% for the Harris Hip Score data, for the metal-metal and metal-poly groups, respectively.

The mean Harris Hip Scores for the metal-metal and metal-poly groups at 24+ months were 94.7 and 94.1 points, respectively. The radiographic findings were difficult to interpret because the sponsor did not distinguish between significant and non-significant radiographic findings. The incidences of acetabular radiolucencies at the 24-month and 24+ month time point for the metal-metal group were 27.3% and 22.2%, respectively, and for the metal-poly group were 16.1% and 8.8%, respectively. Acetabular cup migration in the superior-inferior direction occurred in 0% of the patients in both the metal-metal group and the metal-poly group at 24 months. Brooker Grade III heterotopic ossification occurred in 0% of the metal-metal group and 4.2% of the metal-poly group at 24 months. There was one patient (1.5%) in the metal-metal group who had Class IV heterotopic ossification at 6 months.

The sponsor identified the following intraoperative complication: dislocation. Postoperative operative site complications included dislocation/subluxation, femoral fracture, superficial wound infection, trochanteric bursitis, hematoma, pain, and wound problem. Postoperative systemic complications included cancer, cardiovascular, deep vein thrombosis, and pulmonary embolus.

There were no device removals or revisions for the metal-metal and metal-poly groups.

Study D:

The investigation was a prospective, multi-center, historically controlled clinical trial performed in the U.S. The diagnostic indication was non-inflammatory degenerative joint disease (NIDJD), which included osteoarthritis, avascular necrosis, developmental hip dysplasia, and traumatic arthritis. All patients received the metal acetabular liner. The acetabular shells were implanted without cement, but both cemented and uncemented femoral prostheses were used.

The Harris Hip Score was used for clinical assessments. No radiographs were available for this study.

As indicated above, the results of this study will not be used as a basis for this reclassification. Therefore, further analyses of these data will not be reviewed.

Summary

The patient follow-up data is poor for each of the studies at the 24-month evaluation time point. Only one group had a follow-up rate above 50% at 2-years. For Study A, the follow-up rates are 36.7% and 46.0% for the Metal-Metal and Metal-Poly groups, respectively. For Study B, the follow-up rates are 42.5% and 47.2% for the Metal-Metal and Metal-Poly groups, respectively. For Study C, the follow-up rates are

Orthopaedic Surgical Manufacturers Association (OSMA)
Metal-on-Metal Semi-Constrained Hip Joint Prosthesis Reclassification Petition

47.2% and 56.1% for the Metal-Metal and Metal-Poly groups, respectively. The follow-up rates are inadequate. The sponsor did not provide a missing data analysis.

Similarly, the amounts of clinical and radiographic data available at the 24-month time point for each study were inadequate. Study A had 34.9% and 48.0% of the radiographic data and 33.9% and 44.0% of the Harris Hip Score data, for the metal-metal and metal-poly groups, respectively. Study B had 35.6% of the radiographic data and 23.0% of the Harris Hip Score data available. Study C had 45.8% and 47.0% of the radiographic data and 41.7% and 47.0% of the Harris Hip Score data available for the metal-metal and metal-poly groups, respectively.

The mean Harris Hip Scores were uniformly excellent for all three studies for all groups: 95.1, 98.4, and 94.7 for the metal-metal groups (Study A, B, and C, respectively) and 91.5 and 94.1 for the metal-poly groups (Study A and C, respectively). As discussed above, the radiographic data is difficult to interpret. There is a seemingly high incidence of acetabular radiolucencies, for example 27.3% in the metal-metal group at 24 months, but this probably represents all radiolucencies and does not, therefore, distinguish between progressive (significant) and non-progressive (not significant) radiolucencies. The types and incidences of intraoperative, operative site, and systemic adverse events were indistinguishable between the metal-metal and metal-poly groups. The rate of device removal and/or revision surgery was low: only 2 patients with metal-metal devices required removal or revision surgery.

These clinical studies have insufficient patient follow-up rates and data availability to provide a basis for establishing the safety or effectiveness of the device.

Summary of the Literature on the Metasul Hip

The sponsor provided 6 references pertaining to the clinical results of the Metasul metal-metal hip replacement. Three of the articles provided (Dorr, Wan, et al., Dorr, Hilton, et al., and Hilton, et al.) are probably reports on the same set of patients at different time points. The most recent article (Dorr, Wan, et al.) reports the longest follow-up duration and should, therefore, provide the most useful information regarding the long-term results. The other two articles do not add any significant clinical data. The articles by Wagner and Weber describe additional clinical information on the Metasul metal-metal hip. In summary, the 3 literature articles (Dorr, Wan, et al., Wagner, and Weber) provide information on a total of 236 patients (115 men and 121 women), with an average age of 70, 49.5, and 59 years, respectively. There was a minimum 2-year follow-up, averaging 5.2, 2.9, and 3.5 years, respectively. The mean Harris Hip Scores at the last follow-up visit for the Dorr and Wagner patients were 89.6 and 96, respectively, and 98% of the patients in the Weber study achieved Excellent or Good Harris Hip Scores at the last evaluation. There were only 9 revisions (3.8%), but only 6 revisions (2.5%) were for loosening. A survivorship curve (Dorr, Wan, et al.) predicts a 94.1% survivorship at 7 years.